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ORIENTAL UNIVERSITY COURSE

IN

Electro-Medicine, Electro-Surgery and Radiology

No. 680c

BY

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ORIENTAL UNIVERSITY BOOK CONCERN

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OUTLINE.

Electricity has been used as a healing agent for many years. Many new facts and principles have been laid down and many of the old theories have been discarded and electricity has now a firm scientific basis for its employment in medicine. The equipment has been improved upon (being made more perfect and reliable every year) and modes of treatment have been changed with more uniform results.

It is therefore evident that with a science so rapidly developing along various important lines, one can keep abreast only by means of a constant study and the improved teachings, by the efficient courses of instruction under competent teachers.

Realizing this, the Oriental University Medical School has included in its curriculum this course of instruction so as to start the practitioners of various schools of medicine and various methods of healing in the right path.

Electricity can be properly employed in the healing art only by one who understands anatomy, physiology and pathology, because it is not only essential to prescribe or to select the proper form of treatment, but the effects must be noted and the application modified from time to time to suit the individual case.

The nature of electricity is unknown. It is a form of energy producing certain peculiar phenomena, manifesting itself by attractions and repulsions, by the light, heat and chemical effects and by violent disturbances as lightning.

There are three kinds of electricity, viz :

- (1) **STATIC** (frictional or Franklinic electricity) or a charge residing on the surface of the body.
- (2) **DYNAMIC** (galvanic or voltaic electricity, produced by chemical action) flowing through the body.
- (3) **MAGNETISM** (induced electricity—Faradic and High Frequency).

Each of these forms of electricity possesses certain peculiar properties in greater degree than do the others, but fundamentally all the forms are identical.

Static and Dynamic electricity are unidirectional (of two kinds—positive and negative) while magnetism or electricity produced by induction (faradic and high frequency currents) are alternating (frequently changing in polarity).

ELECTRICITY IN THERAPEUTICS.

Matter cannot exist as such without the constant passage of electric currents through the substance of which it is composed, and therefore there is no doubt that whenever the human body is highly electrified, it is at the flood tide of vitality.

While electricity is not a "Cure-all" and will not take the place of all other methods of healing, it is a single remedial agent of very wide range, leaving scarcely a condition of disease in which it cannot be used in some form either as an adjunct or a remedy.

To practitioners who know how to use electricity scientifically, so as to influence pathological conditions in the human body in such a way that this force will assist nature or call forth the latent energies and thus hasten the restorative processes, electricity becomes of real value and gives satisfaction to both the physician and the patient.

In the uses of electricity for therapeutic purposes, there are four definite effects and purposes for its use, viz:

(1) MECHANICAL EFFECTS, for the physical action. These mechanical effects are divided into Perceptible and Imperceptible. Perceptible are responses with muscle contraction, surface irritation or the production of heat. Imperceptible, influence metabolism in a mechanical manner by the passage of the material electrons back and forth through the tissues.

(2) THERMIC EFFECTS, for its effects upon the human body, producing by its application heat by the methods of diathermy or thermo-penetration, for the induction of hyperaemia; thereby increasing metabolism, local phagocytosis and nutrition.

(3) CHEMICAL OR ELECTROLYTIC EFFECTS, for the destruction of neoplasms and the transmission by ionization of chemical agents into the tissues (Ionic Medication) and other effects produced by the constant or galvanic current.

(4) STIMULATING EFFECTS, derived from the peculiar action of electricity as a local means of stimulation, exciting various vasomotor and reflex nervous phenomena, local and general, by means of various methods of application (such as auto-condensation, the application of vacuum tube electrodes, resonator discharges from the high potential effleuve, and local stimulation by other applications to the surface of the body), which effect deep centers, producing reflex effects in different ways upon the organism.

Besides these four principal effects we may also include two more, viz: Actinic and Psychic.

The apparatus employed in Electro-Medicine comprise the Galvanic battery, Faradic coil, Static, Sinusoidal and High Frequency machines for the administration of various currents.

It is well to mention here that the sinusoidal current does not exist *per se* but may be any current (Galvanic or Faradic) passed through an oscillating rheostat so as to represent a sine curve or a horizontal letter "S" (S) and alternating in character. It may be slow or rapid according to the frequency (number of sine curves in a specified period of time).

There are two forms of Faradic current—Primary Faradic and Secondary Faradic.

High Frequency current is of two forms—D'Arsonval current (having a high amperage and relatively low voltage) and Oudin or a current from the Tesla secondary (having a high voltage and infinitesimally small amperage). D'Arsonval current is administered in the form of Auto-condensation, Auto-conduction and the direct application or Diathermy (Thermo-Penetration).

Oudin or a current from the Tesla secondary is administered by means of vacuum tubes or other electrodes.

The field of application of electricity in the healing art is a large one, and the indications for its use in therapeutics are plentiful. By means of various currents and modalities, we are able:

- (1) Cause powerful muscular contractions of voluntary and involuntary muscular fibres;

- (2) Stimulate the nerves and tune them to normal vibration producing profound sensory effects;

- (3) Relieve pain or over-irritation and inflammatory conditions;

- (4) Dilate or constrict cutaneous blood vessels, and increase or decrease hemorrhage;

- (5) Increase or decrease the blood pressure, without producing heart depression;

- (6) Correct faulty metabolism, and hasten elimination of waste products, such as urea, uric acid, carbon dioxide, etc.;

- (7) Harden or liquefy the tissue;

- (8) Produce anaesthesia and artificial respiration;

- (9) Decompose and introduce through the unbroken skin various remedies, direct to the seat of pain with a view of obtaining the desired effect, etc.

In addition to the above mentioned therapeutic properties, various electrical modalities have been found of special value in minor surgery; while the value of light, heat, ozone and mechanical vibration produced electrically has been exemplified in the successful treatment of various nervous, rheumatic, respiratory, digestive, skin and other affections.

The Radiant Light and Heat which affects an increased circulation, thereby increasing local nutrition and repair, as well as arresting processes of infection and relaxing the tissues, has been recognized by the clinicians at the front in the world war, who have demonstrated its great value in the treatment of open wounds and painful conditions, and it requires no further recommendation, except a statement that there are absolutely no contra-indications for its use.

IN DIAGNOSIS electricity is of special value. Apart from Radiography (which is described in our course on Roentgenology) by means of which we can easily detect foreign bodies, fractures, dislocations and malpositions within the body, hepatic, renal and bladder calculi, and various affections of the lungs and the gastro-

intestinal tract; and apart from the different electroscopes by which we are able to explore the body cavities, electricity plays an important part in diagnosis, as it enables us also to do the following:

(1) Test muscular and nervous degeneration and to determine the degree of pathological excitability (Reaction of Degeneration).

(2) Distinguish between the different forms of paralysis—Central and Peripheral;

(3) Tell whether disease is feigned or real (detect malingering);

(4) Distinguish between apparent and real death (Electro-Bioscopy);

(5) Differentiate between nervous and inflammatory pains of the ovary, and thus differentiate pyosalpinx from ovarian neuralgia and prevent unnecessary surgery, etc.;

(6) Accurately interpret various reflex symptoms (see Electro-Reflex Diagnosis on page 152 of Matijaca's Principles of Electro-Medicine, etc.);

(7) Graphically record the electrical changes of the heart muscle during its activity—and from such precise records, which are as characteristic as photographs or finger-prints, we can form certain conclusions in regard to the nervous control of the heart, the rapidity of impulse formation, the rhythmicity of their discharge, the conductivity of the cardiac structure and perhaps of their contractility, and thereby frequently determine the site of certain cardiac lesions; form a definite opinion in regard to the prognostic importance of certain heart abnormalities; establish the action of various remedies or treatments, etc. (See Electro-Cardiography on page 145, Matijaca's Principles of Electro-Medicine, etc.)

Some of the future possibilities of electricity in therapeutics are the abstraction of metallic poisons from the body by Ionization; safe local and general anaesthesia, with loss of consciousness and relaxation, relief of pain and the production of sleep, etc.

(All these have already been successfully accomplished during various experiments—and there is no doubt that they gradually will be adopted in practice.)

It will be seen from the foregoing that the field of Electro-Medicine and Electro-Surgery, from a scientific understanding of the various methods of application, has passed from the stage of empiricism and skepticism to the stage of scientific calculation. There is no agency which is capable of filling so large a role in therapeutics now as the intelligent use of the various electrical methods, and none in the hands of the skilled operator promises so much for the relief of various conditions, not responsive to other methods, as the scientific employment of electricity as it is now used in the laboratory of the physician skilled in the modern methods of application.

TEXTBOOKS.

ELEMENTARY BOOKS.

- Abbott, Essentials of medical electricity for medical students and nurses, \$1.25 (Saunders).
Baines, Electro-pathology and therapeutics, \$2.00 (Chicago med.).
Bennett, Electro-therapeutic guide, 9th ed., \$3.00 (Nat'l coll. el. ther.).
Humphris, Electro-therapeutics for practitioners, \$2.40 (Longmans).
Matijaca, Electro-therapy in the abstract for busy practitioners, \$1.00 (Oriental Un. Bk. Con.).
Matijaca, Principles of electro-medicine, electro-surgery and radiology, \$3.00 (Oriental Un. Bk. Con.).
Morton, Essentials of medical electricity, 3rd ed., \$2.50 (Mosby).

SPECIAL BRANCHES AND RELATED SUBJECTS.

- Baines, Studies in electro-physiology (animal and vegetable), \$5.00 (Dutton).
Coleman, Electricity in diseases of the eye, ear, nose, and throat, \$5.00 (Courier-Herald Press, Lincoln, Ill.).
Eberhart, Working manual of high frequency current, 4th ed., \$2.50 (New medicine pub. co., 25 E. Wash. st., Chicago).
Garton, Electro-therapeutics for military hospitals, \$1.00 (Chicago med.).
Guilleminot, Handbook of electricity in medicine, \$2.50 (Rebman).
Magill, Notes on galvanism and faradism, \$1.50 (Hoeber).
Martin, Measurement of induction shocks, \$1.25 (Wiley).
Maurer, Use of electricity on the face and scalp, \$1.50 (Marinello co.).
Morton, Textbook of radiology, \$3.00 (Treat).
Richardson, Electron theory of matter, 2d ed., \$4.50 (Putnam).
Rice, Electricity in gynecology 2d ed., \$1.50 (Laing & Co.).
Robertson, Studies in electro-pathology, \$5.00 (Dutton).
Sloan, Electro-therapy in gynecology, \$4.00 (Hoeber).
Sturridge, Dental electro-therapeutics, 2d ed., \$2.75 (Lea).

COMPLETE TEXTBOOKS.

- Jacoby, Electricity in medicine, \$5.00 (Blakiston).
Jones, Medical electricity, 7th ed., \$4.50 (Blakiston).
Morton, Textbook of radiology, \$4.50 (Mosby).
Neiswanger, Electro-therapeutical practice, 19th ed., \$3.50 (Chicago med.).
Tousey, Medical electricity, 2d ed., \$9.00 (Saunders).

Note:—All books may be ordered from the Oriental University Book Concern, at publishers' prices stated, adding 10 per cent. if to be forwarded by mail.

HOW TO PROCEED IN THE STUDY.

Begin with the study of Matijaca's "Principles of Electro-Medicine, Electro-Surgery and Radiology." After you have mastered this work you will have learned the necessary principles, electro-physics, various electrical measurements, various currents and modalities used in therapeutics, the apparatus producing these currents, etc. In other words, you will learn all the essentials; but do

not be mislead into the belief that this work is a complete treatise on the subject and that you have learned everything that there is to this science and art.

There are many large volumes published on the subject of Electro-Medicine and Electro-Surgery which are very valuable for reference and for further study to those who are familiar with the principles of the subject. Your aim should be to become an expert electrician, as well as a good physician, and by constant study and research you will become more proficient. After mastering the above named book I advise you to get Neiswanger, "Electro-Therapeutical Practice"; follow this with Guilleminott's "Electricity in Medicine," or Jacoby's textbook. On Special Branches, study diseases of eye, ear, etc. (Coleman), dentistry (Sturridge), and gynecology (Sloan, Rice).

PRACTICAL TEST WORK REQUIRED.

By all means complete your education in this science by a course of practical instruction in a good institution teaching the practical part of the subject or under a physician who is successfully employing it in his practice, so that you may be ready to do the practical work yourself. Our own College in Chicago is recommended. Apply through the Oriental University Office.

EXAMINATION QUESTIONS ON ELECTRO-MEDICINE, ETC., COURSE, No. 680c.

- (1) Describe the Voltage, Amperage and Resistance and discuss the Ohm's Law.
- (2) Describe the generation of the dynamic current (contents of a galvanic cell; how the current is generated; what is electrolyte, and include in your discussion that of various battery circuits, polarization, battery formation, etc.).
- (3) Discuss the "attraction and repulsion"; Electrolysis and Ionic medication.
- (4) How can electricity be generated by magnetism?
- (5) Describe the Morton Wave current.
- (6) What is an alternating current? What is a cycle? What do you understand by frequency?
- (7) What is the difference between the D'Arsonval and the current from the Tesla secondary? (difference in voltage and amperage, etc.?)
- (8) What high frequency modalities are administered by the bi-polar method and what modalities by the mono-polar method?
- (9) Discuss Diathermy, its physiological action and the method of administration.
- (10) What electrical modalities can be administered by means of water, and what precautions for safety have to be taken?
- (11) Discuss the Reaction of Degeneration and its usefulness.



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(12) Describe Cautery and Fulguration and the difference between the two.

(13) Discuss the bactericidal effect of light. What form of light is most bactericidal?

(14) Discuss Mechanical Vibration (Centripetal, Centrifugal, Slow, Rapid, etc.). In what conditions is it contra-indicated?

(15) What is Elcetrocardiography? What are the component parts of the Electrocardiograph? Draw a diagram of the normal electrocardiogram.

(16) Discuss Electro-Reflex Diagnosis, describing its technic.

(17) Draw a diagram of the primary and secondary windings of the Induction coil.

(18) What is meant by a closed core transformer?

(19) Define the following terms: Watt—Kilo-Watt—Milliampere—Anode—Cathode—Conductor—Insulator and Dielectric.

(20) Discuss Ozone from the therapeutic standpoint, and how it is produced and purified for therapeutic purposes.